

## REMARKS

Applicant acknowledges receipt of the Office Action dated December 16, 2004, in which the Examiner objected to claim 14; rejected claims 1-14 as anticipated by Callender et al. [Chem. Mater., 9, 2418-2433 (1997)] (hereinafter “the Callender paper”); and rejected claims 1-14<sup>1</sup> as anticipated by Barron (US 6322890); Applicant has amended the claims and respectfully traverses the rejections for the reasons set out below.

### Objection to claim 14

Claim 14 has been amended in the manner suggested by the Examiner and should therefore no longer be objectionable.

### § 102 Rejection over the Callender paper

In rejecting the claims as anticipated by the Callender paper, the Examiner cites a passage in the paper that describes the preparation of a carboxylate-alumoxane by adding pseudoboehmite to a vigorously stirred mixture of acetic acid in water. The Examiner also cites a preparation method in which pseudoboehmite and (methoxyethoxy)acetic acid are refluxed in water. Finally, the Examiner states that vigorous stirring and refluxing read on the “mechanical shear” of the present claims.

First, Applicants would point out that the “mechanical shear” needed to achieve the conditions needed for the present method is not likely to result from either “vigorous stirring” or refluxing. While it is true that stirring can cause shear forces to be applied to the mixture, it is also true that stirring can be accomplished with relatively little shear.<sup>2</sup> Thus, shear is not an inherent property of stirring. Similarly, refluxing refers to the maintenance of a mixture at a predetermined temperature by providing a carrier fluid having its boiling point within the predetermined temperature range and simultaneously providing sufficient heat to boil the carrier fluid and sufficient cooling to condense the evaporated carrier fluid. While the boiling of the carrier fluid results in some mixing, one of ordinary skill in the art would not typically refer a reflux operation as causing “mechanical shear.”

Applicants have discovered that under certain conditions, which include elevated

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<sup>1</sup> Paragraph 5 of the Office Action states that “Claim 14 are rejected...” Because it would not be logical to enter a § 102 rejection against a dependent claim, Applicant assumes that the Examiner intended to type “Claims 1-14...”

<sup>2</sup> By way of example only, see Exhibit A attached hereto, which is a printout of [http://www.capitalcontrols.com/water\\_purification/disinfection\\_products/polymer\\_feed/semblex\\_polymax\\_liquid\\_dry.jsp](http://www.capitalcontrols.com/water_purification/disinfection_products/polymer_feed/semblex_polymax_liquid_dry.jsp), (printout attached), indicating that low-shear mixing both available and desirable in some instances.

temperature and high shear, the desired alumoxanes can be formed in a matter of minutes, rather than the several hours that were required using previously known techniques. Because there is no single threshold temperature or shear rate above which the desired effect occurs, however, Applicants do not wish to quantify the claims by reciting a specific temperature or shear rate.<sup>3</sup> Nevertheless, Applicants respectfully submit that the Callender paper does not anticipate the claims as filed, inasmuch as does not teach the application of “mechanical shear.”

Second, claim 1 has been amended to require that the claimed mixing be carried out “in the substantial absence of a solvent.” This amendment further distinguishes the present claims from the teachings of the Callender paper, which teaches only procedures in which alumoxanes are produced in the presence of a solvent. Applicants have discovered that not only is a solvent unnecessary, but its presence actually impedes the formation of the alumoxanes. This is in direct contradiction of the teachings of the references. Hence, claims as amended are distinguishable over the art.

#### § 102 Rejection over Barron ‘890

U.S. Patent 6,322,890 is also cited by the Examiner<sup>4</sup> as an anticipating reference. The ‘890 patent relates to the formation of heterogeneous solid supra-molecular alkylalumoxanes. Nothing in the ‘890 patent teaches or suggests any type of mechanical mixing or the application of mechanical shear as required by the present claims, in fact, the ‘890 patent teaches refluxing as the technique for achieving the desired reaction, thereby suggesting that shear is not a factor. Because the present claims require mechanical shear, they are not anticipated by the ‘890 patent.

Furthermore, as noted by the Examiner, the ‘890 patent teaches at col. 5, ll. 39-41 that “The carboxylate-substituted alumoxane nano-particles are prepared by the reaction of boehmite or pseudoboehmite with a carboxylic acid in a suitable solvent.” (emphasis added). As discussed above, claim 1 has been amended to require that the claimed mixing be carried out “in the substantial absence of a solvent,” and is therefore distinguishable over this reference.

#### Additional Distinctions

Applicants respectfully submit that the dependent claims, in addition to being patentable for the reasons set out above, recite additional features that distinguish them over the art of record. Specifically:

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<sup>3</sup> But see New claims 15 and 16 discussed *infra*.

<sup>4</sup> Applicants point out that that the ‘890 patent has an inventor in common with the present application.

Claim 4 requires that the method be carried out substantially in the absence of a liquid phase. This is directly contrary to the teachings of the references, which all teach the use of a liquid phase.

Claim 5 requires that the carboxylate-alumoxane particles be formed within two hours of initiation of shear application and Claim 6 requires that formed be within one hour of initiation of shear application. Notably, the two Examples in the '890 patent include a solvent and require 72 and 24 hours, respectively, the solvent- refluxing examples in the Callender paper require 24 hours, and the stirred example in the Callender paper requires the presence of a solvent.

Claim 10 requires that the mixture be subjected to mechanical shear by passing it through a tube at a linear velocity of at least about 1,000 ft/min. None of the cited references teach the application of shear by rapid passage of the mixture through a tube. Furthermore, because none of the references suggests that shear is important to the desired results, it would not have been obvious to one reading the references, that passing the mixture through a tube would have the desired effect.

Claim 11 requires that the mixture be subjected to mechanical shear by passing it through a device comprising a rotor and a stator. Again, the cited references do not teach the application of mechanical shear and certainly do not teach the use of a rotor and stator device for that purpose.

#### New Claims

Applicants have added new claims 15 and 16, which depend from claim 1 recite limitations supported in the specification and claims as-filed. The new claims highlight the distinctions discussed above and are allowable for the reasons set out above.

#### Conclusion

Applicant believes that they have responded to each grounds for rejection and therefore respectfully request that the Examiner reconsider and withdraw the rejections. If the Examiner has any questions or otherwise feels it would be advantageous, he is encouraged to telephone the undersigned at (713)238-8043.

Respectfully submitted,



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